Patent Claims

1. Microscope in which a light-transmitting specimen is arranged between two objectives (2, 3; 20, 21) having at least approximately identical optical characteristics and at least one of the two objectives (3, 21) is followed by a mirror (5, 23) which reflects the light transmitted through the specimen (1, 19) back into itself exactly.

2. Microscope according to claim 1, characterized in that the two objectives (2, 3; 20, 21) have the same numerical aperture (NA) and the same other characteristics, wherein both objectives (2, 3; 20, 21) are preferably constructed as planapochromats with a NA greater than or equal to 1.4.

3. Microscope according to claim 1 or 2, with incident illumination and field transmission of the image information, characterized in that one of the objectives (2, 3) serves as a microscope objective (2) and the second objective (3) is part of a reflecting device (4) through which the specimen (1) is imaged onto itself with lateral and vertical accuracy.

4. Microscope according to one of the preceding claims, characterized in that diaphragms, Wollaston prisms, polarizers and/or other subassemblies for optical contrasting are arranged in the beam path.

5. Microscope according to one of the preceding claims, but with a coherent illumination source in which one of the mirrors (5) is constructed as a phase-conjugating mirror.

6. Microscope according to one of the preceding claims, characterized in that a dichroic beam splitter (8) is provided for reflecting into the illumination source (6).

7. Microscope according to one of the preceding claims, characterized in that another mirror (12) is provided between the microscope objective (2) and eyepiece (11), the specimen (1) being imaged on this mirror (12) through the microscope objective (2),

wherein this mirror (12) passes the illumination beam but does not pass a selected beam component, preferably fluorescent radiation, coming from the specimen (1).

8. Microscope according to claim 1 or 2 constructed as a laser scanning microscope, characterized in that one of the objectives (20, 21) serves as a microscope objective (20) and the second objective (21) is part of a reflecting device (22) having a phase-conjugating mirror or an adaptive mirror (23) by which the wavefront of the reflected light is made to coincide with the wavefront of the transmitted light.

9. Microscope according to claim 8, characterized in that the adaptive mirror (23) is provided with a deformable mirror surface arranged on a diaphragm, and a plurality of individual electrodes are located opposite the diaphragm on its side remote of the mirror surface, and electric voltage is applied to the diaphragm on the one hand and to the electrodes on the other hand, and the deformation of the diaphragm is brought about by changing the voltages and electrostatic forces acting between the diaphragm and electrodes, or the diaphragm is connected, on its side remote of the mirror surface, to a plurality of individual piezoelectric drives and the deformation of the diaphragm is brought about by controlling the piezoelectric drives in different ways.

10. Microscope according to claim 9, characterized in that the electrodes and/or the piezoelectric drives communicate with a detection device for a beam component which is coupled out of the observation beam path, preferably fluorescent radiation proceeding from the specimen.

11. Microscope according to one of the preceding claims, characterized in that the reflecting device (22) is constructed as a brightfield arrangement having two objectives which together form an optical system with an infinite output intersection length.

12. Microscope according to one of the preceding claims, characterized in that the reflecting device (22) can be swiveled out of the microscope beam path and a photomultiplier (13) can be swiveled in in its place for transmitted-light detection.

13. Microscope according to one of the preceding claims, characterized in that at least one of the objectives (2, 3; 20, 21) is connected with adjusting devices for displacement in axial and/or radial direction and the adjustment is carried out depending on the assessment of the observation beam path with respect to its intensity and/or contrast.

14. Microscope according to claim 12, characterized in that the adjusting devices are coupled with drive elements, preferably piezomechanical drive elements.

15. Microscope according to one of the preceding claims, characterized in that there is a detector (17) for a beam component which is coupled out of the observation beam path, preferably fluorescent radiation proceeding from the specimen (19).